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(54) **SANDPAPER REPLACEMENT DEVICE**

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B24B 37/26 (2012.01)

(52) **U.S. Cl.**
CPC ***B24D 9/085*** (2013.01); ***B24B 37/26*** (2013.01)
USPC **451/8**; 451/11; 451/458

(58) **Field of Classification Search**
CPC B24B 37/26; B24B 37/042; B24B 37/24
USPC 451/5, 8, 11, 56, 458
See application file for complete search history.

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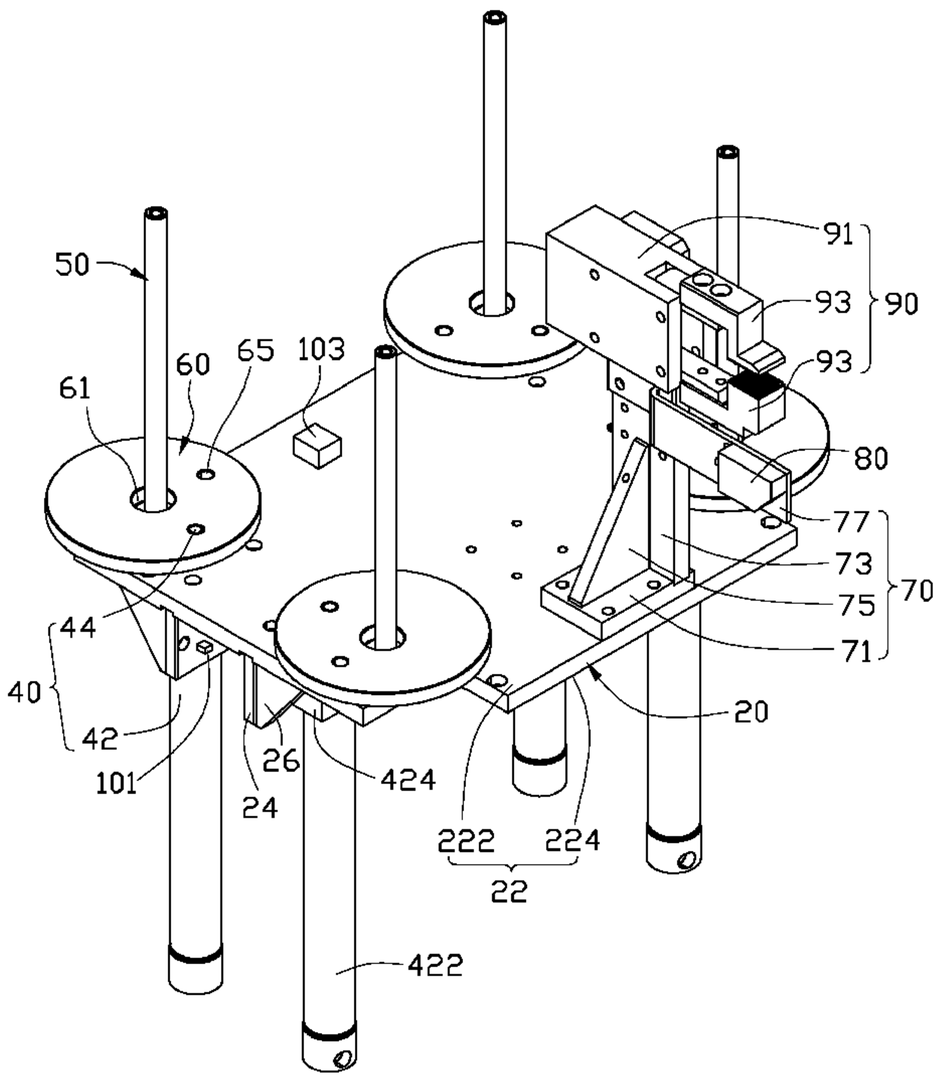
(57) **ABSTRACT**

A sandpaper replacement device is used for replacing sandpaper of a polishing device, including a support platform, a driver, a driving detector sensor, a clamping member, a clamping detector and a controller. The driver includes a cylinder body and an extension rod movably positioned on the cylinder body. The cylinder body is positioned on the support platform, and the extension rod passing through and protruding out from the support platform. The driving detector sensor is positioned on the support platform adjacent to the extension rod. The clamping member includes a main body and two claws positioned oppositely to each other on the main body. The main body is mounted on the support platform away from the cylinder body. The clamping detector is positioned adjacent to the two claws. The controller is electrically connected to the driver, the driving detector sensor, the clamping detector and the clamping member.

14 Claims, 2 Drawing Sheets



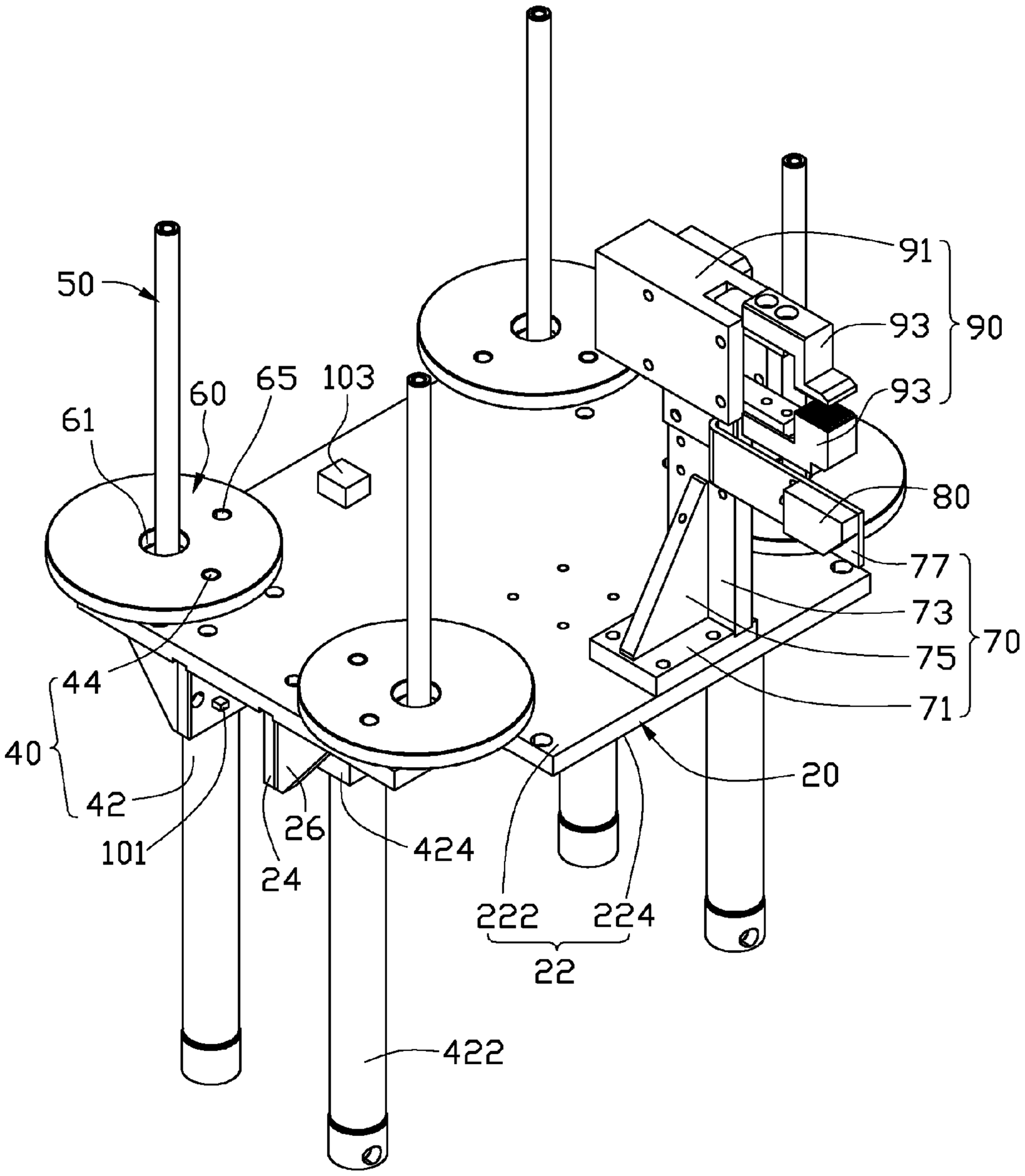

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FIG. 1

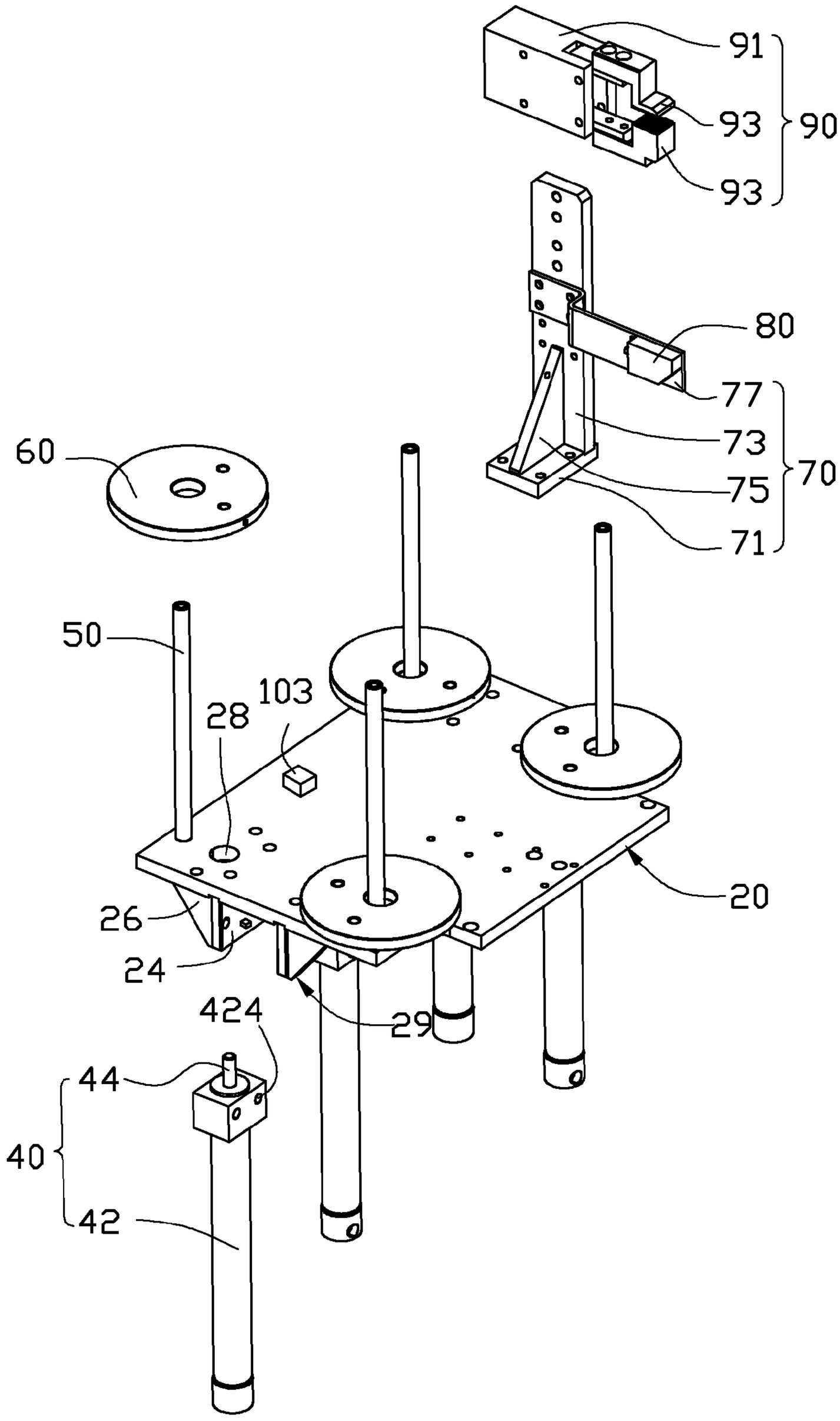

FIG. 2

SANDPAPER REPLACEMENT DEVICE

BACKGROUND

1. Technical Field

The present disclosure generally relates to sandpaper-replacement devices, and particularly to a sandpaper-replacement device of an automated polishing line.

2. Description of the Related Art

Robots equipped with polishing tools or devices are used for smoothing out of the workpiece surfaces. The sandpapers that are used during the polishing process need to be replaced after a certain usage time to ensure polishing quality. The used sandpapers are usually manually removed from the polishing devices, and then new sandpapers are supplied and attached or mounted on the polishing devices. However, efficiency of the replacement process for the sandpaper is relative low. In addition, there is a potential for accident due to the danger during the process of manually replacing the sandpapers.

Therefore, there is room for improvement within the art.

BRIEF DESCRIPTION OF THE DRAWING

The components in the drawings are not necessarily drawn to scale, the emphasis instead placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. **1** shows an isometric view of a sandpaper replacement device of an embodiment.

FIG. **2** is an exploded, isometric view of the sandpaper replacement device of FIG. **1**.

DETAILED DESCRIPTION

FIG. **1** shows a sandpaper replacement device **100** of an embodiment of present disclosure. The sandpaper replacement device **100** is applied, adapted and used for replacing sandpaper used in a polishing device (not shown). The polishing device includes an attachment plate (not shown). The sandpaper is mounted, attached or adhered to the attachment plate for performing polishing. In the illustrated embodiment, the sandpaper replacement device **100** can be configured and applied to replace sandpapers for four polishing devices.

The sandpaper replacement device **100** includes a support platform **20**, four drivers **40**, four driving detector sensors **101**, four guiding members **50**, four discharge plates **60**, an installation assembly **70**, a clamping detector **80**, a clamping member **90**, and a controller **103**. Each of the drivers **40** partially passes through and protrudes out from the support platform **20**. Each driving detector sensor **101** is positioned adjacent to one corresponding driver **40**. Four guiding members **50** are mounted on the support platform **20** for guiding the transport or movement of the sandpaper during a replacement process of the sandpaper. Each discharge plate **60** sleeves on one of the four guiding members **50** to support the sandpapers. The installation assembly **70** is mounted on the support platform **20** adjacent to the discharge plates **60**. The clamping detector **80** and the clamping member **90** are positioned on the installation assembly **70**. The controller **103** is electrically connected to the four drivers **40**, the four driving detector sensors **101**, the clamping detector **80**, and the clamping member **90** to control the sandpaper replacement device **100**. The clamping detector **80** is configured for detecting as to whether the sandpaper needs to be replaced upon arriving to a first preset position, and then sending a first signal to the controller **103**. The controller **103** controls the clamping member **90** to clamp and tear off the used and worn sandpaper to be replaced according to the first signal. The driving detector sensors **101** are used for detecting as to whether the polishing devices need to be supplied with new sandpaper when arriving at a second preset position, and then sending a second signal to the controller **103**. The controller **103** controls the drivers **40** to drive the discharge plates **60** to push new sandpaper to the attachment plates of the polishing device. In other embodiments, the number of the drivers **40** are matched to be corresponding to the number of the polishing devices, and the number of the guiding members **50** and of the discharge plates **60** are matched corresponding to the number of the drivers **40**.

The support platform **20** includes a support board **22**, four fixing blocks **24**, and eight support blocks **26**. The support board **22** includes a first mounting surface **222** and a second mounting surface **224** opposite to the first mounting surface **222**. Four through holes **28** are defined in the support board **22** adjacent to four corners of the support board **22**. Each fixing block **24** is fixed on the second mounting surface **224** adjacent to one through hole **28**. The four fixing blocks **24** are substantially parallel to each other. Each pair of two support blocks **26** are substantially perpendicularly connected with two sides of one corresponding fixing block **24** to form a receiving space **29**, and are substantially parallel to each other.

Four drivers **40** are positioned on a stable plane, (eg. floor, or a table). Each driver **40** includes a cylinder body **42** and an extension rod **44** movably positioned on one end of the cylinder body **42**. The cylinder body **42** includes a cylinder tube **422** and an installation block **424** positioned at an end of the cylinder tube **422** adjacent to the extension rod **44**. The installation block **424** is mounted on a side surface of the fixing block **24** and is received in the receiving space **29**. The extension rod **44** passes through the through hole **28** and protrudes out from the first mounting surface **222**. In the illustrated embodiment, the drivers **40** are pen cylinders. Each driving detector sensor **101** is mounted on one of the four fixing blocks **24**. In other embodiments, the driving detector sensors **101** can be positioned at other components adjacent to the extension rod **44**.

The guiding members **50** are mounted on the first mounting surface **222**. Each of the guiding members **50** is positioned adjacent to one corresponding through hole **28** and one corresponding extension rod **44**. The guiding member **50** is substantially a rod.

The discharge plate **60** is substantially a circular plate. Each discharge plate **60** sleeves on one corresponding guiding member **50** above the support board **22** and is fixedly connected to an end of the extension rod **44** away from the cylinder body **42**. A sleeve hole **61** is defined in a center of the discharge plate **60** for allowing the discharge plate **60** to sleeve on the guiding member **50**. Two mounting holes **65** are defined in the discharge plate **60** adjacent to the sleeving hole **61**, and are spaced from each other. Inner walls of the mounting holes **65** are threaded. The extension rod **44** is screwed in one of the two mounting holes **65**. In the illustrated embodiment, a shape and a size of the discharge plate **60** corresponds to the size required by the sandpaper so as to allow the drivers **40** to be able to push and lift up the sandpaper conveniently.

The installation assembly **70** includes a bottom board **71**, an installation board **73**, a strengthening member **75**, and a mounting member **77**. The bottom board **71** is mounted on the first mounting surface **222** adjacent to one edge thereof. The installation board **73** is substantially perpendicularly connected to one end of the bottom board **71** and extends toward a direction away from the bottom board **71**. The strengthening member **75** is a substantially right triangular board for

strengthening the support of the installation board **73**. One right-angled edge of the strengthening member **75** is substantially perpendicularly connected with the bottom board **71**. Another right-angled edge of the strengthening member **75** is substantially perpendicularly connected with the installation board **73**. The mounting member **77** is a substantially bent board, which is mounted on a side surface of the installation board **73** that is connecting with the strengthening member **75**, and is positioned above the strengthening member **75**. The mounting member **77** is positioned substantially parallel to the support board **22**, and extends out of the support board **22**. The clamping detector **80** is positioned on an end of the mounting member **77** away from the installation board **73**.

The clamping member **90** is installed on the installation board **73** away from the bottom board **71** and above the mounting member **77**. The clamping member **90** includes a main body **91** and two claws **93**. The main body **91** is connected with an end of the installation board **73**. The claws **93** are oppositely positioned on one end of the main body **91** facing outside of the support platform **20**. The main body **91** is capable of driving the two claws **93** to clamp or release the used or worn out sandpaper. In the illustrated embodiment, the clamping member **90** is a jaw cylinder.

In assembly, the fixing blocks **24** and the support blocks **26** are mounted on the first mounting surface **222**. The installation block **424** of each driver **40** is fixedly assembled with one corresponding fixing block **24**, and the extension rod **44** protrudes out from the first mounting surface **222**. The guiding members **50** are positioned on the first mounting surface **222**. Each of the discharge plates **60** sleeves on one corresponding guiding member **50**, and is fixedly-connected with the extension rod **44**. The bottom board **71** is positioned on the first mounting surface **222**. The installation board **73** is connected with the bottom board **71**. The strengthening member **75** is connected with the installation board **73** and the bottom board **71**, respectively. The mounting member **77** is fixed on the installation board **73** away from the bottom board **71**. The clamping detector **80** is positioned on the mounting member **77**. Each driving detector sensor **101** is mounted on one corresponding fixing block **24**. The clamping member **90** is positioned on the installation board **73**. The controller **103** is electrically connected with the drivers **40**, the driving detector sensors **101**, the clamping member **90** and the clamping detector **80**.

In use, a plurality of stacked new sandpapers are sleeved on each guiding member **50** at above the discharge plate **60**. Using the replacement of sandpaper on one of the polishing devices as an illustrative example, the polishing device is driven to arrive at the first preset position when the used or worn out sandpaper is needed to be replaced. The clamping detector **80** sends the first signal to the controller **103** when the clamping detector **80** detects that the polishing device has arrived at the first preset position. The controller **103** controls the clamping member **90** to close the two claws **93** to grip the used sandpaper. The polishing device is driven to move relative to the clamping member **90** according to a preset path, and pull and remove the used sandpaper from the polishing device. The two claws **93** then release the used sandpaper. Later, the polishing device is driven to arrive at the second preset position, and the attachment plate is positioned above the discharge plate **60**. The driving detector sensor **101** sends the second signal to the controller **103** when the clamping detector **80** detects that the polishing device has arrived at the second preset position. The controller **103** controls the driver **40** to push the discharge plate **60** to the attachment plate of the polishing device. Then the new sandpaper on the discharge plate **60** is adhered, attached or mounted to the attachment plate. The extension rod **44** returns to its original position.

The sandpaper replacement device **100** with a simple structure is capable of automatically replacing sandpaper of the polishing devices. The clamping member **90** clamps and tears off the used sandpaper from the polishing devices. The extension rod **44** is capable of pushing the new sandpaper to the attachment plates. Therefore, the efficiency of replacing the sandpaper will be improved. Time and labor consumption used for sandpaper replacement will be saved or reduced. In addition, the shape and the size of the discharge plate **60** allows the sandpaper to be conveniently pushed by the drivers **40**. Further, the guiding members **50** guide the movement and transport of the sandpaper during the sandpaper replacement procedure and process.

In other embodiments, the number of the clamping members **90** can be changed as needed.

In other embodiments, the discharge plates **60** and the guiding members **50** can be omitted, and the sandpaper is then directly placed on the support board **22** so that the sandpaper can be pushed by the extension rods **44** to the polishing devices.

In other embodiments, the installation assembly **70** can be omitted, the clamping member **90** and the clamping detector **80** are positioned apart on the support board **22**.

While the present disclosure has been described with reference to particular embodiments, the description is illustrative of the disclosure and is not to be construed as limiting the disclosure. Therefore, various modifications can be made to the embodiments by those of ordinary skill in the art without departing from the true spirit and scope of the disclosure, as defined by the appended claims.

What is claimed is:

1. A sandpaper replacement device used for replacing sandpapers for a polish device, comprising:

a support platform;

a driver comprising a cylinder body and an extension rod movably positioned on the cylinder body, the cylinder body being positioned on the support platform, and the extension rod passing through and protruding out from the support platform;

a driving detector sensor positioned on the support platform adjacent to the extension rod;

a clamping member comprising a main body and two claws oppositely positioned on one end of the main body, and the main body being mounted on the support platform away from the cylinder body;

a clamping detector positioned adjacent to the two claws; and

a controller electrically connected to the driver, the driving detector sensor, the clamping detector and the clamping member, wherein when the clamping detector detects sandpaper needing to be replaced having arrived at a first preset position, the clamping detector sends a first signal to the controller, the controller controls the clamping member to grip and tear off the sandpaper for replacement from the polishing device according to the first signal, when the driving detector sensor detects the polishing device needing to be supplied new sandpaper having arrived at a second preset position, the driving detector sensor sends a second signal to the controller, and the controller controls the driver to push up the new sandpaper to the polishing device according to the second signal.

2. The sandpaper replacement device of claim **1**, wherein the sandpaper replacement device further comprises a guid-

ing member positioned on a side of the support platform away from the cylinder body adjacent to the extension rod.

3. The sandpaper replacement device of claim **2**, wherein the sandpaper replacement device further comprises a discharge plate sleeving on the guiding member, and fixedly connected with the extension rod.

4. The sandpaper replacement device of claim **3**, wherein a mounting hole is defined in the discharge plate adjacent to the guiding member, and the extension rod is screwed in the mounting hole.

5. The sandpaper replacement device of claim **1**, wherein the support platform comprises a support board and a fixing block fixed on the support board, the cylinder body comprises a cylinder tube and an installation block positioned adjacent to the extension rod, and the installation block is connected with the fixing block.

6. The sandpaper replacement device of claim **5**, wherein the support platform comprises two support blocks, the two support blocks are substantially perpendicularly connected with two sides of the fixing block to form a receiving space, and the installation block is mounted on a side surface of the fixing block and is received in the receiving space.

7. A sandpaper replacement used for replacing sandpapers for a polish device, comprising:

a support platform;

a driver comprising a cylinder body and an extension rod movably positioned on the cylinder body, the cylinder body being positioned on the support platform, and the extension rod passing through and extending out from the support platform;

a driving detector sensor positioned on the support platform adjacent to the extension rod;

an installation assembly mounted on a side of the support platform away from the cylinder body;

a clamping member comprising a main body and two claws oppositely positioned on one end of the main body, and the main body mounted on the installation assembly;

a clamping detector positioned on the installation assembly adjacent to the two claws; and

a controller electrically connected with the driver, the driving detector sensor, the clamping detector and the clamping member, wherein when the clamping detector detects sandpaper needing to be replaced having arrived at a first preset position, the clamping detector sends a first signal to the controller, the controller controls the clamping member to grip and tear off the sandpaper for replacing from the polishing device according to the first signal, when the driving detector sensor detects the polishing device needing to be supplied new sandpaper having arrived at a second preset position, the driving detector sensor sends a second signal to the controller, and the controller controls the driver to push up the new sandpaper to the polishing device according to the second signal.

8. The sandpaper replacement device of claim **7**, wherein the installation assembly comprises a bottom board, an installation board and a mounting member, the bottom board is mounted on the support platform away from the cylinder body, the installation board is substantially perpendicularly connected with the bottom board, the mounting member is mounted on the installation board away from the bottom board, the clamping member is positioned on the installation board above of the mounting member, and the clamping detector is positioned on the mounting member.

9. The sandpaper replacement device of claim **8**, wherein the installation assembly comprises a strengthening member, the strengthening member is connected with the bottom board and the installation board, and the mounting member is positioned above the strengthening member.

10. The sandpaper replacement device of claim **7**, wherein the sandpaper replacement device further comprises a guiding member positioned on a side of the support platform away from the cylinder body adjacent to the extension rod.

11. The sandpaper replacement device of claim **10**, wherein the sandpaper replacement device further comprises a discharge plate sleeving on the guiding member and fixedly connected with the extension rod.

12. The sandpaper replacement device of claim **11**, wherein a mounting hole is defined in the discharge plate adjacent to the guiding member, and the extension rod is screwed in the mounting hole.

13. The sandpaper replacement device of claim **7**, wherein the support platform comprises a support board, and a fixing block, the fixing block is fixed on the support board, the cylinder body comprises a cylinder tube and an installation block positioned adjacent to the extension rod, and the installation block is connected with the fixing block.

14. The sandpaper replacement device of claim **13**, wherein the support platform comprises two support blocks, the two support blocks are substantially perpendicularly connected with two sides of the fixing block to form a receiving space, and the installation block is mounted on a side surface of the fixing block facing towards the receiving space and is received in the receiving space.

* * * * *